Computer Programming

(COMP PROG)

4534

Computer Programming is a business course that introduces students to computer programming using various languages. Throughout the course, information regarding programming-related careers and career/educational paths are provided. Logical thinking processes are required for problem analysis and solving. Instructional strategies should include project based activities, in-baskets, minibaskets, and LAPS, which expose students to workplace scenarios that require the development/programming of simple applications.

- Recommended Grade Level: 10-12
- Recommended Prerequisites: Digital Communication Tools and Algebra I
- Credits: A one- or two-credit course over one or two semesters
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- A Career Academic Sequence, Career-Technical program, or Flex Credit course
- Course content standards/performance expectations and Indiana Academic Standards integrated at: http://www.doe.in.gov/octe/bme/curriculum/contentstandards.htm
- Teacher Requirements: http://doe.in.gov/dps/licensing/assignmentcode
- Career Clusters: This course may benefit students in career pathways in several career clusters; it is a recommended component for several career pathways in the Information Technology and Science, Technology, Engineering & Mathematics clusters
- Career pathway information: http://www.doe.in.gov/octe/facs/CrrClstrGrid.html

CP 1 Computer Concepts

CP 1.1 Content Standard: Students demonstrate a basic knowledge of the development of computer and operating systems.

Performance Expectations

CP 1.1.1 Trace the development of computers and their impact on society.
CP 1.1.2 Demonstrate a basic knowledge of the ethical and social implications of computer use.
CP 1.1.3 Describe the functions of computer hardware.
CP 1.1.4 Demonstrate an understanding of computer theory (bits, bytes, memory, etc.).
CP 1.1.5 Compare operating systems (DOS, Linux, Windows, OS etc.).

CP 1.2 Content Standard: Students demonstrate a basic knowledge of the evolution of programming languages.

Performance Expectations
CP 1.2.1 Recognize key contributors to computer programming.
CP 1.2.2 Distinguish between high-level vs. low-level languages.
CP 1.2.3 Distinguish between procedural and object-oriented programming languages.

CP 1.3 Content Standard: Students appraise computers and their languages.

Performance Expectations
CP 1.3.1 Propose a computer system based on the evaluation of hardware and software.

CP 2 Variables/Constants

CP 2.1 Content Standard: Students demonstrate a basic understanding of the different data types.

Performance Expectations
CP 2.1.1 Explain variables and constants.
CP 2.1.2 Identify different variable types.
CP 2.1.3 Describe the syntax rules for naming variables and constants.

CP 2.2 Content Standard: Students use variables and constants in a program.

Performance Expectations
CP 2.2.1 Apply the syntax rules for naming variables.
CP 2.2.2 Declare variable types in the program code.
CP 2.2.3 Define constants in the program code.
CP 2.2.4 Initialize variables and constants.

CP 2.3 Content Standard: Students design procedures for manipulating variables and constants.

Performance Expectations
CP 2.3.1 Construct programming statements that modify variables.
CP 2.3.2 Construct programming statements that incorporate constants.

CP 3 Input/Output Statement

CP 3.1 Content Standard: Students identify ways to enter data and return information.

Performance Expectations
CP 3.1.1 List and describe various input commands.
CP 3.1.2 List and describe various output commands.
CP 3.1.3 State the appropriate ways to prompt the user for data.
CP 3.1.4 Identify output-formatting procedures.
CP 3.1.5 Recognize the various methods of clearing input and output data.

CP 3.2 Content Standard: Students use input/output commands and manipulators in programs.

Performance Expectations

CP 3.2.1 Write statements that receive input.
CP 3.2.2 Write statements that produce and format output.
CP 3.2.3 Write statements that clear input/output.

CP 3.3 Content Standard: Students recognize and demonstrate how data is received and manipulated to produce information.

Performance Expectations

CP 3.3.1 Create a program that receives data, manipulates data, and produces formatted output.

CP 4 Program Development

CP 4.1 Content Standard: Students develop an understanding of the programming development life cycle.

Performance Expectations

CP 4.1.1 List and explain in sequence the steps used in problem solving.
CP 4.1.2 Define algorithm.
CP 4.1.3 List and explain tools used in developing the algorithm (flowcharts, IPO charts, TOE charts, and Pseudocode).

CP 4.2 Content Standard: Students practice using the steps in the program development life cycle.

Performance Expectations

CP 4.2.1 Practice identifying what the program should do (program analysis).
CP 4.2.2 Plan the solution by developing an algorithm (program design).
CP 4.2.3 Determine how the input will be obtained and how the output will be displayed (create user-friendly interface design).
CP 4.2.4 Translate the algorithm into code.
CP 4.2.5 Test the data (debug).
CP 4.2.6 Document the program.

CP 4.3 Content Standard: Students convert algorithms to programs using program development tools.

Performance Expectations

CP 4.3.1 Diagram the logical steps for the algorithm using one of the design tools.

CP 5 Decision Statements

CP 5.1 Content Standard: Students demonstrate a basic understanding of decision-making logic.

Performance Expectations

CP 5.1.1 Describe how decisions are made in programs.
CP 5.1.2 List and explain relational operators (<, >, =, <=, >=, not equal).
CP 5.1.3 List and explain logical operators (AND, OR, NOT).

CP 5.1.4 Explain Boolean logic.

CP 5.2 Content Standard: Students apply decision-making statements.

Performance Expectations
CP 5.2.1 Construct decision statements (IF, IF Else statements).
CP 5.2.2 Construct multiple decision statements (CASE, SWITCH).
CP 5.2.3 Construct nested decision statements.

CP 5.3 Content Standard: Students analyze decision statements.

Performance Expectations
CP 5.3.1 Compare and contrast the different types of decision statements.
CP 5.3.2 Differentiate the use of appropriate decision statements.
CP 5.3.3 Design programs that implement decision-making statements.

CP 6 Repetition Structures

CP 6.1 Content Standard: Students demonstrate a basic understanding of repetition structures.

Performance Expectations
CP 6.1.1 Describe the purpose and use of repetition structures.
CP 6.1.2 Identify the various types of repetition structures.
CP 6.1.3 Explain the causes and effects of an infinite loop.
CP 6.1.4 Explain the effects of a definite loop.

CP 6.2 Content Standard: Students use repetition structures in programs.

Performance Expectations
CP 6.2.1 Construct a pre-test repetition structure (While).
CP 6.2.2 Construct a post-test repetition structure (Do).
CP 6.2.3 Construct a fixed-repetition structure (For).
CP 6.2.4 Construct a variable-repetition structure (Repetition).

CP 6.3 Content Standard: Students analyze repetition structures used in a program.

Performance Expectations
CP 6.3.1 Compare and contrast the different types of loops.
CP 6.3.2 Differentiate the appropriate use of loops.
CP 6.3.3 Design programs that implement loops.

CP 7 Math Operations

CP 7.1 Content Standard: Students demonstrate a basic understanding of math operations.

Performance Expectations
CP 7.1.1 Identify arithmetic operators.
CP 7.1.2 Recognize the order of operations.
CP 7.1.3 Interpret mathematical formulas.
CP 7.1.4 Explain the purpose of incrementing and decrementing in a program.
CP 7.1.5 Describe the ramifications of dividing by zero.

CP 7.2 Content Standard: Students apply mathematical operations in programs.

Performance Expectations
CP 7.2.1 Construct formulas using mathematical operators.
CP 7.2.2 Solve formulas using order of operations.
CP 7.2.3 Construct code that utilizes division by zero (results in an error).

CP 7.3 Content Standard: Students analyze mathematical operations in programs.

Performance Expectations
CP 7.3.1 Discover the effects of incrementing and decrementing in formulas.
CP 7.3.2 Examine the results of division by zero in a formula.
CP 7.3.3 Create programs that use mathematical formulas to solve problems.

CP 8 Modularization

CP 8.1 Content Standard: Students distinguish between various modules (subroutine, subprogram, procedure, function, method).

Performance Expectations
CP 8.1.1 Identify the type of module block that applies to the language.
CP 8.1.2 Define the module block: subroutine (COBOL, RPG, BASIC), subprocedure and procedure (Pascal, Visual Basic), function (C, C++) and method (C#, Java, .Net).
CP 8.1.3 Explain the concept of a user-defined module.
CP 8.1.4 Define the structure of an empty module.
CP 8.1.5 Define the structure of a passing module.

CP 8.2 Content Standard: Students design a module block.

Performance Expectations
CP 8.2.1 Apply a built-in module block.
CP 8.2.2 Construct a user-defined module block.
CP 8.2.3 Apply the user-defined module block.
CP 8.2.4 Modify the user-defined module to pass/return data (parameters/arguments).

CP 8.3 Content Standard: Students evaluate a module block.

Performance Expectations
CP 8.3.1 Compare and contrast built-in vs. user-defined module block.
CP 8.3.2 Examine the results of passing the data (parameters/arguments) into the module.
CP 8.3.3 Examine the results of returning the data (parameters/arguments) from the module.

CP 9 Arrays

CP 9.1 Content Standard: Students demonstrate a basic understanding of arrays.

Performance Expectations
CP 9.1.1 Define an array.
CP 9.1.2 Identify the elements of an array.
CP 9.1.3 Explain the different types of arrays.
CP 9.1.4 Identify the different data types used in arrays.

CP 9.2 Content Standard: Students use an array in a program.

Performance Expectations
CP 9.2.1 Declare and initialize an array.
CP 9.2.2 Access elements of an array.
CP 9.2.3 Sort and search an array.
CP 9.2.4 Pass an array to a module.

CP 9.3 Content Standard: Students analyze an array.

Performance Expectations
CP 9.3.1 Compare and contrast the different types of arrays.
CP 9.3.2 Differentiate the appropriate use of an array.
CP 9.3.3 Evaluate the effectiveness of a passed array.

CP 10 File Input/Output (I/O)

CP 10.1 Content Standard: Students develop an understanding of file organization.

Performance Expectations
CP 10.1.1 Define the different types of file organization.
CP 10.1.2 Explain how to open a file.
CP 10.1.3 Explain how to add items to an existing file.
CP 10.1.4 Explain how to read data from the file.
CP 10.1.5 Explain how to modify data in a file.
CP 10.1.6 Explain how to close a file.
CP 10.1.7 Explain how to merge data from multiple files into a single file.
CP 10.1.8 Explain how to sort data within a file.

CP 10.2 Content Standard: Students apply the principles of file input/output (I/O).

Performance Expectations
CP 10.2.1 Open a file.
CP 10.2.2 Write data to a file.
CP 10.2.3 Add data into an existing file.
CP 10.2.4 Read data from a file.
CP 10.2.5 Modify data in existing file(s).
CP 10.2.6 Close a file.
CP 10.2.7 Merge data from multiple files into a single file.
CP 10.2.8 Sort data within a file.

CP 10.3 Content Standard: Students maintain the program that manages the I/O files.

Performance Expectations
CP 10.3.1 Create a program that manipulates I/O files.
CP 10.3.2 Revise a program that manipulates I/O files.

CP 11 Object-Oriented Programming

CP 11.1 Content Standard: Students develop an understanding of Object-Oriented Programming (OOP).

Performance Expectations
CP 11.1.1 Define an object class.
CP 11.1.2 Define the attributes of an object.
CP 11.1.3 Define behaviors of an object.
CP 11.1.4 Explain inheritance and encapsulation.

CP 11.2 Content Standard: Students demonstrate how objects and classes are used in a program.

Performance Expectations
CP 11.2.1 Construct a class.
CP 11.2.2 Construct an object.

CP 11.3 Content Standard: Students create classes and objects in a program**.**

Performance Expectations
CP 11.3.1 Create a program that implements user-defined objects and classes.

CP 12 Development of Web Programming

CP 12.1 Content Standard: Students review the development of the World Wide Web.

Performance Expectations
CP 12.1.1 Trace the development of the World Wide Web and its impact on society.
CP 12.1.2 Demonstrate a basic knowledge of the ethical and social implications of computer use in the Internet environment.
CP 12.1.3 Describe the uses of the World Wide Web.
CP 12.1.4 List tools for creating HTML documents.
CP 12.1.5 Recognize different protocols used.
CP 12.1.6 Differentiate between the major browsers.

CP 12.2 Content Standard: Students apply the principles of HTML pages.

Performance Expectations
CP 12.2.1 List tools for creating HTML documents.
CP 12.2.2 Create an HTML document that will work with different protocols and run in the major browsers.

CP 12.3 Content Standard: Students evaluate the equipment needed for the World Wide Web.

Performance Expectations
CP 12.3.1 Propose a system based on the evaluation of web tools, protocols, plug-ins, and browsers.

CP 13 Organization, Planning, and Layout

CP 13.1 Content Standard: Students define the principles of a visually-appealing, informative, and functional web site.

Performance Expectations
CP 13.1.1 Discuss the various audiences that web sites may target.
CP 13.1.2 Define a mission statement.
CP 13.1.3 Brainstorm for content.
CP 13.1.4 Describe the interface between human and computer interaction.
CP 13.1.5 Describe the web folder hierarchy and file naming strategies.

CP 13.2 Content Standard: Students apply the principles of effective web design planning.

Performance Expectations
CP 13.2.1 Determine the intended audience.
CP 13.2.2 Construct a mission statement that states the purpose of the web site.
CP 13.2.3 Plan and collect necessary content.
CP 13.2.4 Illustrate visual representation of the web pages.
CP 13.2.5 Illustrate a visual representation of the web hierarchy.

CP 13.3 Content Standard: Students appraise the web site design plan.

Performance Expectations
CP 13.3.1 Analyze and revise the web site design plan.

CP 14 Creating a Basic Web Page

CP 14.1 Content Standard: Students explore basic web page elements.

Performance Expectations
CP 14.1.1 Recognize the role of a text editor and web browser.
CP 14.1.2 State the relationship between a text editor and a web browser.
CP 14.1.3 Define HTML tags and their purpose.
CP 14.1.4 Explain the purpose of opening and closing tags.

CP 14.2 Content Standard: Students use basic tags to create a web page.

Performance Expectations
CP 14.2.1 Use HTML standard tags (e.g., <html>, <head>, <title>, <body>, etc.).
CP 14.2.2 Use basic formatting tags (e.g., <h*n*>, <p>,
, <ul>, <ol>, <li>, <hr>, , <u>, <b>, <i>, <a>, <pre>, <sub>, <sup>, <font>, <img>, strike, etc.).
CP 14.2.3 Use tag attributes and character symbols (e.g., background, bgcolor, copyright symbols, etc.).
CP 14.2.4 Display the web page in a web browser.

CP 14.3 Content Standard: Students evaluate a basic web page.

Performance Expectations
CP 14.3.1 Assess the functionality of the tags.
CP 14.3.2 Modify hypertext as necessary.

CP 15 Creating a Table

CP 15.1 Content Standard: Students develop an understanding of the role of tables in a web page.

Performance Expectations
CP 15.1.1 Identify the purpose of a table.
CP 15.1.2 Identify the tags and attributes used in a table.
CP 15.1.3 Explain how to enter and format data in a table.

CP 15.2 Content Standard: Students create and use a table in a web page.

Performance Expectations
CP 15.2.1 Determine the necessity of a table.
CP 15.2.2 Determine number of rows and columns needed.
CP 15.2.3 Construct a table.
CP 15.2.4 Enter and code the data that will appear in the table.

CP 15.3 Content Standard: Students appraise the effectiveness of the table.

Performance Expectations
CP 15.3.1 Judge the appearance and functionality of the table.
CP 15.3.2 Revise the table as necessary.

CP 16 Creating a Web Page Using Frames

CP 16.1 Content Standard: Students develop an understanding of the role of frames in a web page.

Performance Expectations
CP 16.1.1 List and explain the various reasons for using frames in a web page.
CP 16.1.2 Identify the tags and attributes used to format a web page that uses frames.
CP 16.1.3 Explain how a web page that uses frames functions.
CP 16.1.4 Identify necessary components used in a frameset page (frame definition file).

CP 16.2 Content Standard: Students design a web page using frames.

Performance Expectations
CP 16.2.1 Create the pages used in each frame.
CP 16.2.2 Determine the number, size, and function of each frame.
CP 16.2.3 Create the frameset page (frame definition page).
CP 16.2.4 Display the frameset page in frame-enabled browser.

CP 16.3 Content Standard: Students assess the effectiveness of frames.

Performance Expectations
CP 16.3.1 Evaluate the appearance and functionality of frames.
CP 16.3.2 Modify the frameset page as necessary.

CP 17 Creating Forms

CP 17.1 Content Standard: Students develop an understanding of the use of forms in a web page.

Performance Expectations

CP 17.1.1 Explore how and why forms are used within a web site.
CP 17.1.2 Identify the necessary tags and attributes used to create a form.
CP 17.1.3 Identify the major components (controls) used in creating a form (check box, radio button, scrolling text box, text box, input button, drop-down menu, etc.).
CP 17.1.4 Discuss the various ways to handle and process data that is gathered by forms (e-mail, CGI, text file, etc.).

CP 17.2 Content Standard: Students design a web page that uses form components.

Performance Expectations

CP 17.2.1 Determine which form components are needed.
CP 17.2.2 Create a web page that uses these form components.
CP 17.2.3 Demonstrate how to change the properties of each form component.
CP 17.2.4 Determine how the data will be processed and handled.
CP 17.2.5 Display the form in a web browser.

CP 17.3 Content Standard: Students evaluate the functionality of the form.

Performance Expectations

CP 17.3.1 Critique the appearance of the form.
CP 17.3.2 Test the form.
CP 17.3.3 Modify the form as necessary.

CP 18 Publishing the Web Site

CP 18.1 Content Standard: Students ascertain the issues surrounding publishing a web site.

Performance Expectations

CP 18.1.1 Recognize the role of META tags.
CP 18.1.2 Identify and explore different search tools that currently exist.
CP 18.1.3 Recognize the various browser issues involved with publishing a web site.
CP 18.1.4 Recognize the screen resolution concerns that are related to a web site.
CP 18.1.5 Explain issues surrounding different file sizes.
CP 18.1.6 Identify the different Internet connection speeds.
CP 18.1.7 Explain the various publishing/hosting options.

CP 18.2 Content Standard: Students view the web site on a web server.

Performance Expectations

CP 18.2.1 Determine loading times based on Internet connection speed and file size.
CP 18.2.2 View the web site in different browsers and screen resolutions.
CP 18.2.3 Select a hosting option (i.e., free web hosting, pay servers, school server).
CP 18.2.4 Write META tags for each web page.
CP 18.2.5 Submit web site to online search tools.

CP 18.3 Content Standard: Students evaluate the published web site.

Performance Expectations

CP 18.3.1 Verify that web pages work properly in different resolutions and browsers.
CP 18.3.2 Verify that all META tags are working properly.
CP 18.3.3 Verify that loading times are acceptable.

CP 19 Cascading Style Sheets

CP 19.1 Content Standard: Students define the elements of cascading style sheets.

Performance Standards

CP 19.1.1 Explain the advantages of cascading style sheets.
CP 19.1.2 Explore the inline, external, and embedded cascading style sheets.
CP 19.1.3 Define the basic (properties, attributes) and user-created terms of a cascading style sheet.
CP 19.1.4 Explain the working inheritance of a style sheet.
CP 19.1.5 Explore the uses of classes with a cascading style sheet.

CP 19.2 Content Standard: Students use cascading style sheets in a web page.

Performance Standards

CP 19.2.1 Create a page that uses inline cascading style sheets.
CP 19.2.2 Create a page that uses external cascading style sheets.
CP 19.2.3 Create a page that uses embedded cascading style sheets.
CP 19.2.4 Create a web site that uses inline, external, and embedded cascading style sheets to demonstrate inheritance.
CP 19.2.5 Create a class.

CP 19.3 Content Standard: Students critique a web page containing cascading style sheets.

Performance Standards

CP 19.3.1 Assess the visual appearance and layout of the web page.
CP 19.3.2 Modify the web site as needed.

CP 20 JavaScript

CP 20.1 Content Standard: Students develop an understanding of the role of JavaScript and its basic elements on the Web.

Performance Standards

CP 20.1.1 Explain the importance of JavaScript and its relationship to HTML.
CP 20.1.2 Explain the basic features of JavaScript.
CP 20.1.3 Explain objects, properties, methods, events, and functions.
CP 20.1.4 Explain dialog and message boxes.
CP 20.1.5 Explain data types and operators and how they are used in JavaScript.
CP 20.1.6 Explain control structures and statements that affect JavaScript.

CP 20.2 Content Standard: Students implement dynamic web pages using JavaScript.

Performance Standards

CP 20.2.1 Use objects, properties, methods, events, and functions.
CP 20.2.2 Use dialog and message boxes.

CP 20.2.3 Use data types and operators in JavaScript to make the page interactive.
CP 20.2.4 Use control structures and statements in JavaScript to make the page interactive.

CP 20.3 Content Standard: Students test the JavaScript in a browser.

Performance Standards
CP 20.3.1 Verify that the code works properly.

CP 21 Server-Side Programming

CP 21.1 Content Standard: Students develop an understanding of the role of Server-Side scripts.

Performance Standards
CP 21.1.1 Explain the difference between Client and Server-Side programming.
CP 21.1.2 Explain the basic Server-Side components.
CP 21.1.3 Explain how to create objects.
CP 21.1.4 Explain how to use cookies.
CP 21.1.5 Explain how to use ActiveX Data Objects (ADO) to access a database.
CP 21.1.6 Explain how to manipulate files, directories, and drives using File System Objects (FSO).

CP 21.2 Content Standard: Students create Server-Side scripts.

Performance Standards
CP 21.2.1 Create and use objects.
CP 21.2.2 Write a script that incorporates cookies.
CP 21.2.3 Write a script that incorporates ActiveX Data Objects (ADO) to access a database.
CP 21.2.4 Write a script that incorporates manipulated files, directories, and drivers using File System Objects (FSO).

CP 21.3 Content Standard: Students test the Server-Side scripts.

Performance Standards
CP 21.3.1 Verify that all Server-Side scripts work properly.

CP 22 Career Exploration

CP 22.1 Content Standard: Students explore career possibilities.

Performance Standards
CP 22.1.1 Identify the occupations that exist in the fields of computer programming.

CP 22.2 Content Standard: Students explore the qualifications for careers.

Performance Standards
CP 22.2.1 Research the skills, education required, salary, and benefits of the various careers.

CP 22.3 Content Standard: Students report results of research.

Performance Standards

CP 22.3.1 Present the findings of the research.

Indiana Academic Standards
Integrated into Computer Programming

English/ Language Arts

Standard 1
READING: Word Recognition, Fluency, and Vocabulary Development

11.1.2 Apply knowledge of Greek, Latin, and Anglo-Saxon roots and word parts to draw inferences about the meaning of scientific and mathematical terminology.
11.1.3 Analyze the meaning of analogies encountered, analyzing specific comparisons as well as relationships and inferences.
12.1.2 Apply knowledge of Greek, Latin, and Anglo-Saxon roots and word parts to draw inferences about new words that have been created in the fields of science and math (*gene splicing*, *genetic engineering*).
12.1.3 Analyze the meaning of analogies encountered, analyzing specific comparisons as well as relationships and inferences.

Standard 2
READING: Comprehension

11.2.1 Analyze both the features and the rhetorical (communication) devices of different types of public documents, such as policy statements, speeches, or debates, and the way in which authors use those features and devices.
11.2.2 Analyze the way in which clarity of meaning is affected by the patterns of organization, repetition of the main ideas, organization of language, and word choice in the text.
11.2.3 Verify and clarify facts presented in several types of expository texts by using a variety of consumer, workplace, and public documents.
12.2.1 Analyze both the features and the rhetorical (communication) devices of different types of public documents, such as policy statements, speeches, or debates, and the way in which authors use those features and devices.
12.2.2 Analyze the way in which clarity of meaning is affected by the patterns of organization, repetition of the main ideas, organization of language, and word choice in the text.
12.2.3 Verify and clarify facts presented in several types of expository texts by using a variety of consumer, workplace, public, and historical documents.

Standard 4
WRITING: Process

11.4.1 Discuss ideas for writing with classmates, teachers, and other writers.
11.4.2 Demonstrate an understanding of the elements of discourse, such as purpose, speaker, audience, and form, when completing narrative, expository, persuasive, or descriptive writing assignments.
11.4.4 Structure ideas and arguments in a sustained and persuasive way and support them with precise and relevant examples.
11.4.5 Enhance meaning by using rhetorical devices, including the extended use of parallelism, repetition, and analogy and the issuance of a call for action.
11.4.6 Use language in creative and vivid ways to establish a specific tone.
11.4.8 Use systematic strategies to organize and record information, such as anecdotal scripting or annotated bibliographies.
11.4.9 Use a computer to integrate databases, pictures and graphics, and spreadsheets into word-processed documents.
11.4.10 Review, evaluate, and revise writing for meaning, clarity, achievement of purpose, and mechanics.
11.4.11 Edit and proofread one's own writing, as well as that of others, using an editing checklist.

11.4.12 Revise text to highlight the individual voice, improve sentence variety and style, and enhance subtlety of meaning and tone in ways that are consistent with the purpose, audience, and form of writing.
12.4.1 Engage in conversations with peers and the teacher to plan writing, to evaluate how well writing achieves its purposes, and to explain personal reaction to the task.
12.4.2 Demonstrate an understanding of the elements of discourse, such as purpose, speaker, audience, and form, when completing narrative, expository, persuasive, or descriptive writing assignments.
12.4.4 Structure ideas and arguments in a sustained and persuasive way and support them with precise and relevant examples.
12.4.5 Enhance meaning by using rhetorical devices, including the extended use of parallelism, repetition, and analogy and the issuance of a call for action.
12.4.6 Use language in creative and vivid ways to establish a specific tone.
12.4.8 Use systematic strategies to organize and record information, such as anecdotal scripting or annotated bibliographies.
12.4.9 Use technology for all aspects of creating, revising, editing, and publishing.
12.4.10 Accumulate, review, and evaluate written work to determine its strengths and weaknesses and to set goals as a writer.
12.4.11 Revise, edit, and proofread one's own writing, as well as that of others, using an editing checklist.
12.4.12 Further develop unique writing style and voice, improve sentence variety, and enhance subtlety of meaning and tone in ways that are consistent with the purpose, audience, and form of writing.

Standard 5
WRITING: Applications
11.5.3 Write reflective compositions that:
- explore the significance of personal experiences, events, conditions, or concerns by using rhetorical strategies, including narration, description, exposition, and persuasion.
- draw comparisons between specific incidents and broader themes that illustrate the writer's important beliefs or generalizations about life.
- maintain a balance in describing individual incidents and relate those incidents to more general and abstract ideas.

11.5.4 Write historical investigation reports that:
- use exposition, narration, description, argumentation, or some combination of rhetorical strategies to support the main argument.
- analyze several historical records of a single event, examining critical relationships between elements of the topic.
- explain the perceived reason or reasons for the similarities and differences in historical records with information derived from primary and secondary sources to support or enhance the presentation.
- include information from all relevant perspectives and take into consideration the validity and reliability of sources.
- include a formal bibliography.

11.5.7 Use precise technical or scientific language when appropriate for topic and audience.
11.5.8 Deliver multimedia presentations that:
- combine text, images, and sound and draw information from many sources, including television broadcasts, videos, films, newspapers, magazines, CD-ROMs, the Internet, and electronic media-generated images.
- select an appropriate medium for each element of the presentation.
- use the selected media skillfully, editing appropriately, and monitoring for quality.
- test the audience's response and revise the presentation accordingly.

12.5.3 Write reflective compositions that:
- explore the significance of personal experiences, events, conditions, or concerns by using rhetorical strategies, including narration, description, exposition, and persuasion.
- draw comparisons between specific incidents and broader themes that illustrate the writer's important beliefs or generalizations about life.
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- analyze several historical records of a single event, examining critical relationships between elements of the topic.
- explain the perceived reason or reasons for the similarities and differences in historical records with information derived from primary and secondary sources to support or enhance the presentation.
- include information from all relevant perspectives and take into consideration the validity and reliability of sources.
- include a formal bibliography.

12.5.6 Use varied and extended vocabulary, appropriate for specific forms and topics.

12.5.7 Use precise technical or scientific language when appropriate for topic and audience.

12.5.8 Deliver multimedia presentations that:
- combine text, images, and sound and draw information from many sources, including television broadcasts, videos, films, newspapers, magazines, CD-ROMs, the Internet, and electronic media-generated images.
- select an appropriate medium for each element of the presentation.
- use the selected media skillfully, editing appropriately, and monitoring for quality.
- test the audience's response and revise the presentation accordingly.

Standard 6
WRITING: English Language Conventions

11.6.1 Demonstrate control of grammar, diction, paragraph and sentence structure, and an understanding of English usage.

11.6.2 Produce writing that shows accurate spelling and correct punctuation and capitalization.

11.6.3 Apply appropriate manuscript conventions in writing including title page presentation, pagination, spacing and margins, and integration of source and support material, by citing sources within the text, using direct quotations, and paraphrasing.

12.6.1 Demonstrate control of grammar, diction, paragraph and sentence structure, and an understanding of English usage.

12.6.2 Produce writing that shows accurate spelling and correct punctuation and capitalization.

12.6.3 Apply appropriate manuscript conventions in writing including title page presentation, pagination, spacing and margins, and integration of source and support material, by citing sources within the text, using direct quotations, and paraphrasing.

Standard 7
LISTENING AND SPEAKING: Skills, Strategies, and Applications

11.7.1 Summarize a speaker's purpose and point of view and ask questions to draw interpretations of the speaker's content and attitude toward the subject.

11.7.2 Use rhetorical questions (questions asked for effect without an expected answer), parallel structure, concrete images, figurative language, characterization, irony, and dialogue to achieve clarity, force, and artistic effect.

11.7.3 Distinguish between and use various forms of logical arguments, including:
- inductive arguments (arguments that are highly likely, such as *All of these pears are from that basket and all of these pears are ripe, so all of the pears in the basket are*

ripe) and deductive arguments (arguments that are necessary conclusions based on the evidence, such as *If all men are mortal and he is a man, then he is mortal*).
- syllogisms and analogies (assumptions that if two things are similar in some ways then they are probably similar in others).

11.7.4 Use logical, ethical, and emotional appeals that enhance a specific tone and purpose.

11.7.5 Use appropriate rehearsal strategies to pay attention to performance details, achieve command of the text, and create skillful artistic staging.

11.7.6 Use effective and interesting language, including informal expressions for effect, Standard English for clarity, and technical language for specificity.

11.7.8 Evaluate when to use different kinds of effects (including visuals, music, sound, and graphics) to create effective productions.

11.7.11 Interpret and evaluate the various ways in which events are presented and information is communicated by visual image-makers (such as graphic artists, documentary filmmakers, illustrators, and news photographers).

11.7.12 Critique a speaker's use of words and language in relation to the purpose of an oral communication and the impact the words may have on the audience.

11.7.15 Analyze the techniques used in media messages for a particular audience and evaluate their effectiveness (for example, Orson Welles' radio broadcast *War of the Worlds*).

11.7.16 Deliver reflective presentations that:
- explore the significance of personal experiences, events, conditions, or concerns, using appropriate speech strategies, including narration, description, exposition, and persuasion.
- draw comparisons between the specific incident and broader themes to illustrate beliefs or generalizations about life.
- maintain a balance between describing the incident and relating it to more general, abstract ideas.

12.7.1 Summarize a speaker's purpose and point of view, discuss, and ask questions to draw interpretations of the speaker's content and attitude toward the subject.

12.7.2 Use rhetorical questions (questions asked for effect without an expected answer), parallel structure, concrete images, figurative language, characterization, irony, and dialogue to achieve clarity, force, and artistic effect.

12.7.3 Distinguish between and use various forms of logical arguments, including:
- inductive arguments (arguments that are highly likely, such as *All of these pears are from that basket and all of these pears are ripe, so all of the pears in the basket are ripe*) and deductive arguments (arguments that are necessary conclusions based on the evidence, such as *If all men are mortal and he is a man, then he is mortal*).
- syllogisms and analogies (assumptions that if two things are similar in some ways then they are probably similar in others.)

12.7.4 Use logical, ethical, and emotional appeals that enhance a specific tone and purpose.

12.7.11 Interpret and evaluate the various ways in which events are presented and information is communicated by visual image-makers (such as graphic artists, documentary filmmakers, illustrators, and news photographers).

12.7.12 Critique a speaker's use of words and language in relation to the purpose of an oral communication and the impact the words may have on the audience.

12.7.15 Analyze the techniques used in media messages for a particular audience to evaluate effectiveness, and infer the speaker's character (using, for example, the Duke of Windsor's abdication speech).

12.7.16 Deliver reflective presentations that:
- explore the significance of personal experiences, events, conditions, or concerns, using appropriate speech strategies, including narration, description, exposition, and persuasion.
- draw comparisons between the specific incident and broader themes and to illustrate beliefs or generalizations about life.

- maintain a balance between describing the incident and relating it to more general, abstract ideas.

Algebra I

A1.1 Operations with Real Numbers
A1.1.1 Compare real number expressions.
A1.1.2 Simplify square roots using factors.
A1.1.3 Understand and use the distributive, associative, and commutative properties.
A1.1.4 Use the laws of exponents for rational exponents.
A1.1.5 Use dimensional (unit) analysis to organize conversions and computations.

A1.2 Linear Equations and Inequalities
A1.2.1 Solve linear equations.
A1.2.2 Solve equations and formulas for a specified variable.
A1.2.4 Solve linear inequalities using properties of order.
A1.2.5 Solve combined linear inequalities.
A1.2.6 Solve word problems that involve linear equations, formulas, and inequalities.

A1.5 Pairs of Linear Equations and Inequalities
A1.5.6 Use pairs of linear equations to solve word problems.

A1.9 Mathematical Reasoning and Problem Solving
A1.9.1 Use a variety of problem solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation, and working backwards.
A1.9.2 Decide whether a solution is reasonable in the context of the original situation.
A1.9.3 Use the properties of the real number system and the order of operations to justify the steps of simplifying functions and solving equations.
A1.9.4 Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation, and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously.
A1.9.5 Decide whether a given algebraic statement is true always, sometimes, or never (statements involving linear or quadratic expressions, equations, or inequalities).
A1.9.6 Distinguish between inductive and deductive reasoning, identifying and providing examples of each.
A1.9.8 Use counterexamples to show that statements are false, recognizing that a single counterexample is sufficient to prove a general statement false.

Algebra II

A2.1 Relations and Functions
A2.1.2 Use function notation. Add, subtract, multiply, and divide pairs of functions.
A2.1.3 Understand composition of functions and combine functions by composition.
A2.1.5 Find the zeros of a function.
A2.1.8 Interpret given situations as functions in graphs, formulas, and words.

A2.10 Mathematical Reasoning and Problem Solving
A2.10.1 Use a variety of problem-solving strategies, such as drawing a diagram, guess-and-check, solving a simpler problem, writing an equation, and working backwards.
A2.10.2 Decide whether a solution is reasonable in the context of the original situation.
A2.10.6 Use counterexamples to show that statements are false.

Discrete Math

DM.1 Counting Techniques
DM.1.1 Use networks, traceable paths, tree diagrams, Venn diagrams, and other pictorial representations to find the number of outcomes in a problem situation.
DM.1.2 Use the fundamental counting principle to find the number of outcomes in a problem situation.
DM.1.3 Use combinatorial reasoning to solve problems.
DM.1.4 Use counting techniques to solve probability problems.

DM.2 Matrices
DM.2.1 Use matrices to organize and store data.
DM.2.2 Use matrix operations to solve problems.

DM.7 Game Theory
DM.7.1 Use game theory to solve strictly determined games.
DM.7.2 Use game theory to solve non-strictly determined games.

Geometry

G.8 Mathematical Reasoning and Problem Solving
G.8.2 Decide whether a solution is reasonable in the context of the original situation.
G.8.4 Write and interpret statements of the form “if – then” and “if and only if.”
G.8.5 State, use, and examine the validity of the converse, inverse, and contrapositive of “if – then” statements.
G.8.9 Perform basic constructions, describing and justifying the procedures used. Distinguish between constructing and drawing geometric figures.